

EXERCISES

For more practice, see *Extra Practice*.

Practice and Problem Solving

A Practice by Example


Examples 1 and 2
(pages 82 and 83)

Use the Law of Detachment to draw a conclusion.

1. If a student gets an A on a final exam, then the student will pass the course.
Felicia gets an A on the music theory final exam.
2. If a student wants to go to college, then the student must study hard.
Rashid wants to go to the University of North Carolina.
3. If two lines are parallel, then they do not intersect.
Line ℓ is parallel to line m .
4. If there is lightning, then it is not safe to be out in the open.
Marla sees lightning from the soccer field.

Example 3
(page 83)

If possible, use the Law of Detachment to draw a conclusion. If not possible, write *not possible*.

5. If a figure is a rectangle, then it has two pairs of parallel sides.
Figure $ABCD$ is a rectangle.
6.  **Algebra** If n is a prime number greater than 2, then n^2 is an odd number.
 9^2 is an odd number.
7. If three points are on the same line, then they are collinear.
Points X , Y , and Z are on line m .
8. If an angle is obtuse, then it is not acute.
 $\angle XYZ$ is not obtuse.
9. If you are a Golden Gopher, you've attended the University of Minnesota.
(See photo.)

Example 4
(page 84)

Use the Law of Syllogism to draw a conclusion.

10. **Zoology** If an animal is a red wolf, then its scientific name is *Canis rufus*.
If an animal is named *Canis rufus*, then it is endangered.
11. If two planes intersect, then they intersect in a line.
If two planes are not parallel, then they intersect.
12. If you read a good book, then you enjoy yourself.
If you enjoy yourself, then your time is well spent.
13. If you are studying biology, then you are studying a science.
If you are studying botany, then you are studying biology.

Example 5
(page 84)

Geography Use the Law of Detachment and the Law of Syllogism to draw conclusions from the following statements.

14. If a mountain is the highest in Alaska, then it is the highest in the United States.
If an Alaskan mountain is over 20,300 ft high, then it is the highest in Alaska.
Alaska's Mount McKinley is 20,320 ft high.
15. If you live in Little Rock, then you live in Arkansas.
Levon lives in Little Rock.
If you live in Arkansas, then you live in the 25th state to enter the Union.

B Apply Your Skills

For Exercises 16–21, assume that the following statements are true.

- A. If Maria drinks juice, then it is breakfast time.
- B. If it is lunchtime, then Kira drinks milk and nothing else.
- C. If it is mealtime, then Curtis drinks water and nothing else.
- D. If it is breakfast time, then Julio drinks juice and nothing else.
- E. Maria drinks juice.

Use only the information given above. For each statement, write *must be true*, *may be true*, or *is not true*. Explain your reasoning.

- 16. Julio drinks juice.
- 17. Curtis drinks water.
- 18. Kira drinks milk.
- 19. Curtis drinks juice.
- 20. Maria drinks water.
- 21. Julio drinks milk.

For each of the following, write the first statement as a conditional. If possible, use the Law of Detachment to make a conclusion. If not possible, write *not possible*.

- 22. All national parks are interesting.
Mammoth Cave is a national park.
- 23. **Weather** The temperature is always above 32°F in Key West, Florida.
The temperature is 62°F.
- 24. Every high school student likes music.
Ling likes music.
- 25. All squares are rectangles.
ABCD is a square.



- 26. **Writing** Give an example of a rule used in your school that could be written as a conditional. Explain how the Law of Detachment is used in applying that rule.

For Exercises 27–31, use the cartoon and deductive reasoning to answer *yes* or *no*. If *no*, explain.

- 27. Is a person with a red car allowed to park here on Tuesday at 10:00 A.M.?
- 28. Is a man with a beard allowed to park here on Monday at 10:30 A.M.?
- 29. Is a woman with a wig allowed to park here on Saturday at 10:00 A.M.?
- 30. Is a person with a blue car allowed to park here on Tuesday at 9:05 A.M.?
- 31. Is a person with a convertible with leather seats allowed to park here on Sunday at 6:00 P.M.?

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- 32. **Reasoning** Assume that the following statements are true.

If Anita goes to the concert, Beth will go.
If Beth goes to the concert, Aisha will go.
If Aisha goes to the concert, Ramon will go.

Only two of the four students went to the concert. Who were they?

Challenge

33. **Critical Thinking** Consider the following given statements and conclusion.

Given: If an animal is a fish, then it has gills.

A turtle does not have gills.

You conclude: A turtle is not a fish.

This argument does not use the Law of Syllogism or the Law of Detachment, but it does use good deductive reasoning.

- Draw a Venn diagram to illustrate the given information.
- Use the Venn diagram to help explain why the argument uses good reasoning.



Standardized Test Prep

Multiple Choice

34. What conclusion can you draw from the following two statements?

If a person does not get enough sleep, that person will be tired.

Evan does not get enough sleep.

- | | |
|----------------------------------|----------------------------|
| A. Evan will get enough sleep. | B. Evan will not be tired. |
| C. Evan should get enough sleep. | D. Evan will be tired. |

35. What conclusion can you draw from the following two statements?

If you have a job, then you have an income.

If you have an income, then you must pay taxes.

- If you have a job, then you must pay taxes.
- If you don't have a job, then you don't pay taxes.
- If you pay taxes, then you have a job.
- If you have a job, then you don't have to pay taxes.

Short Response

36. Carl reads anything Andrea chooses to read. Bert reads what Carl chooses to read and Carl reads what Bert chooses. Andrea reads whatever Darla chooses to read.

- Carl is reading *Hamlet*. Who else, if anyone, must also be reading *Hamlet*?
- Exactly three people are reading *King Lear*. Who are they? Explain.

Extended Response

37. Harold, Clara, and Mark each chose a different lunch from three categories: soup, salad, and sandwiches. Each ordered a different drink. Clara will not eat sandwiches. Mark won't eat salad or bread. The person who had the soup also had the iced tea. The person who had the sandwich also had the milk.

- Who drank the milk? How do you know?
- One person ordered mineral water. What food did the water go with? Explain.



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Mixed Review


Lesson 2-2

Is each statement a good definition? If not, find a counterexample.

- 38. An angle is a figure formed by two rays.
- 39. A ray is an angle bisector if and only if it divides an angle into two congruent angles.

Lesson 2-1

Show that each conditional is false by finding a counterexample.

- 40. **Geography** If the name of a state contains the word *North*, then the state borders Canada.
-  41. **Algebra** If you square a fraction, then the result is always greater than the original fraction.

Lesson 1-3

Complete with *always*, *sometimes*, or *never* to make a true statement.

- 42. Two lines that do not intersect are ? parallel.
- 43. Two lines that intersect are ? skew.
- 44. Two segments that intersect are ? coplanar.

A Point in Time



Hercule Poirot as played by David Suchet, 1989–1997.

Most people are not detectives, but as a young woman, the English writer Agatha Christie (1890–1976) correctly deduced that many people would like to be. In 1920 she published her first book, a detective novel entitled *The Mysterious Affair at Styles* in which she introduced the eccentric and ultra-logical Belgian detective Hercule Poirot. In this and in many subsequent novels, Poirot solves mysteries not with guns or car chases but with logical reasoning.



Take It to the NET For more information about Agatha Christie, go to www.PHSchool.com.